

***HQ AFWA/XOGX  
Space Weather Branch  
Space Weather Support to  
Warfighters***



- **Space Weather Impacts to DoD Operations**
- **SpaceWOC Products and their applications**
- **Training Information**



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# ***Space Weather Impacts***

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- **Communications**
- **Navigation**
- **Radar Interference and False Returns**
- **High Altitude Flight**
- **Satellite Operations**
- **Space Object Tracking**

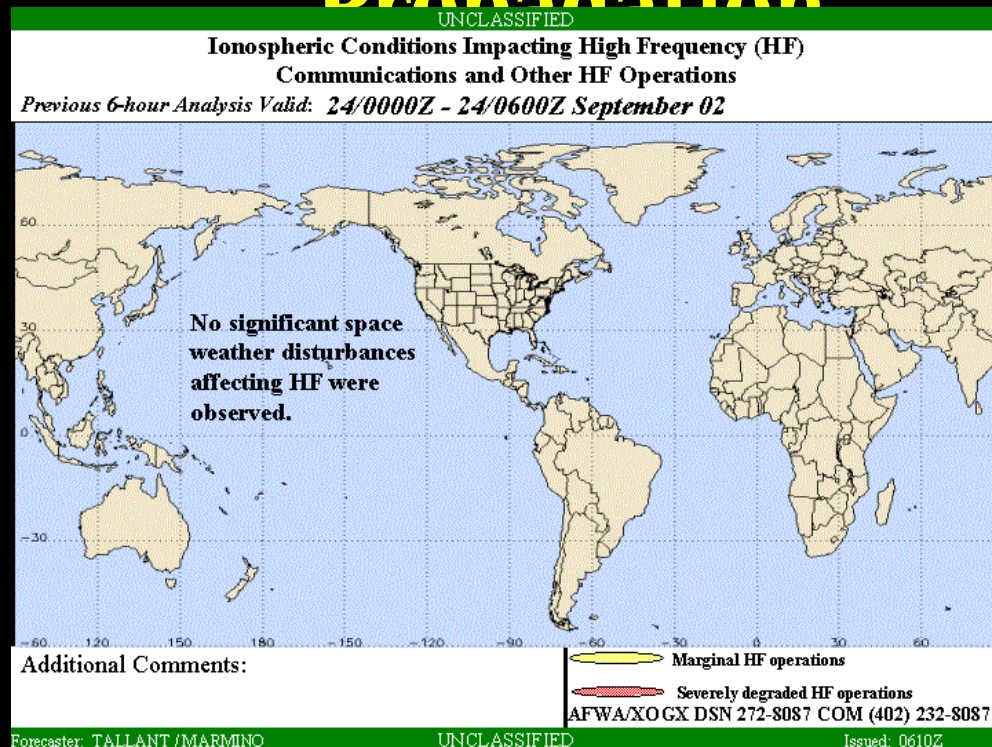


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# Communication Products

## Global/Regional 6-Hr Analysis of Ionospheric Conditions Impacting HF Propagation

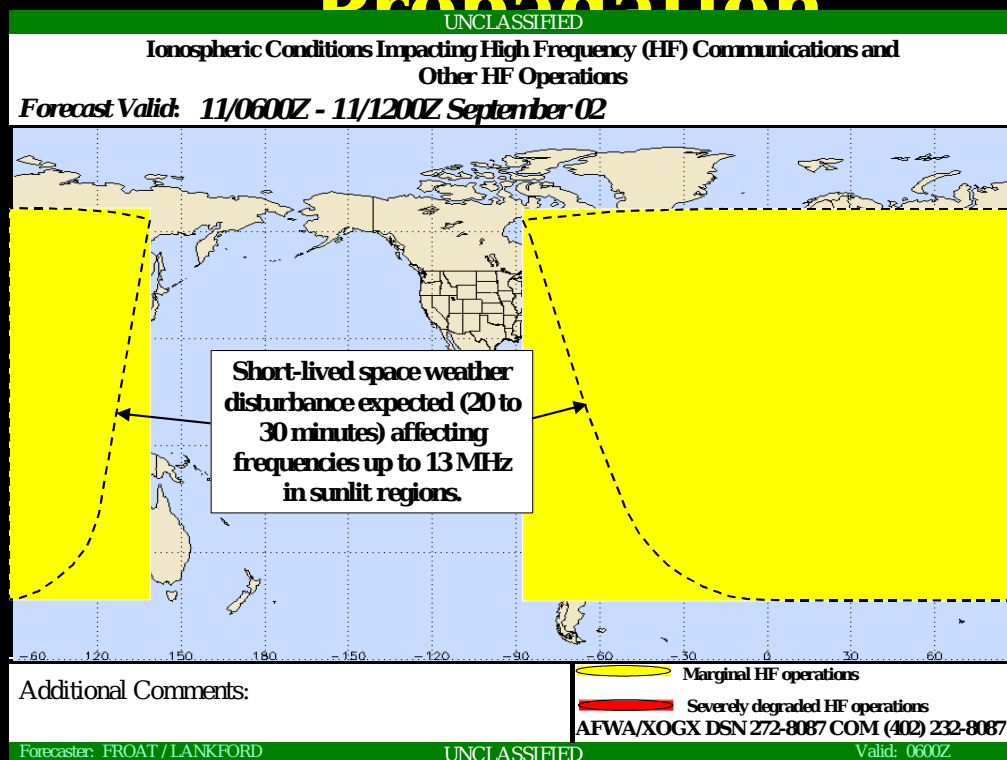


Issued four times daily and available on JAAWIN/JAAWIN-S. Identifies location where space conditions have caused degradation in HF communications and other HF



# Communication Products

## Global/Regional 6-Hr Forecast of Ionospheric Conditions Impacting HF Propagation

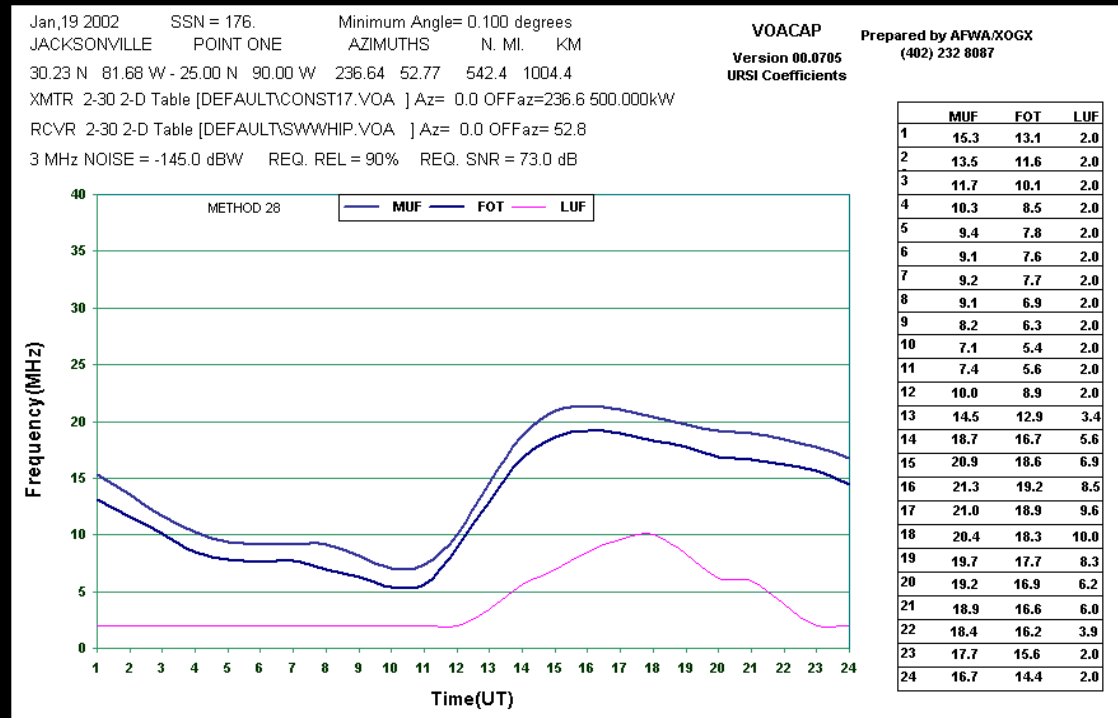


Issued four times daily and available on JAAWIN/JAAWIN-S.  
Identifies locations where space weather conditions are expected to degrade HF communications and other HF applications.



# Communication Products

## Point-to-Point HF Radio Usable Frequency Forecasts



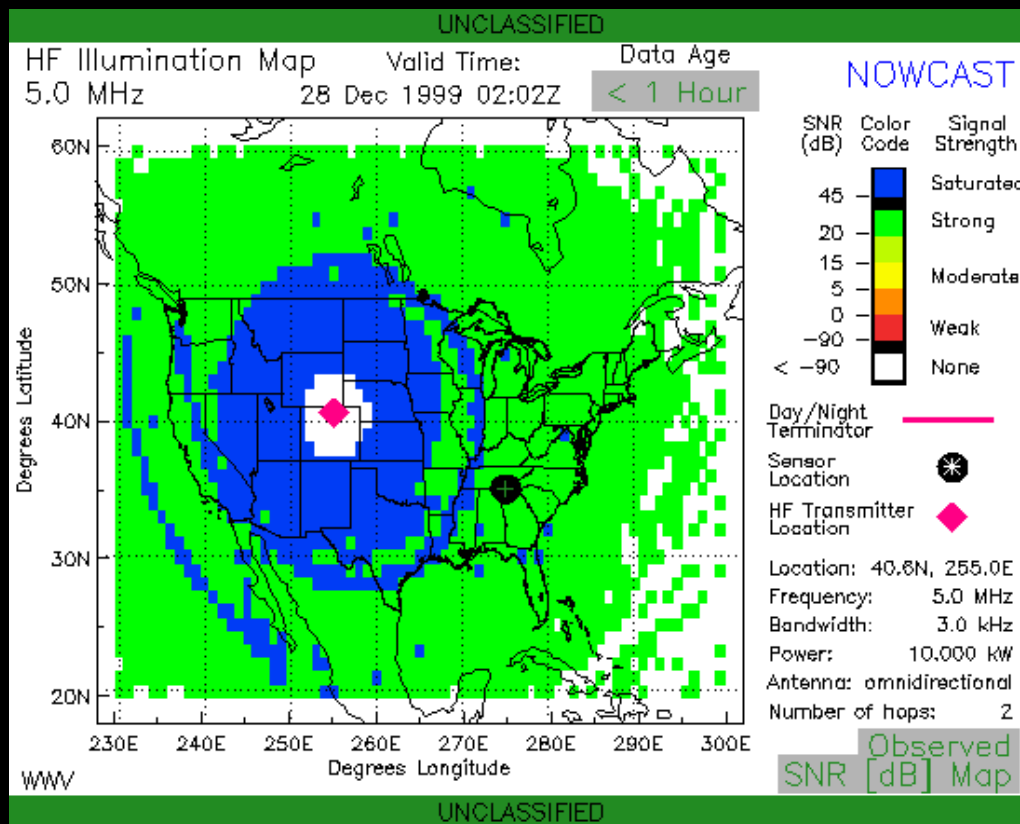
Issued on JAAWIN/JAAWIN-S upon request of customer/user. Identifies maximum and minimum useable HF frequencies for customer-specific transmitter and receiver location based on expected ionospheric conditions.





# Communication Products

## HF Illumination Maps Nowcast/Forecast

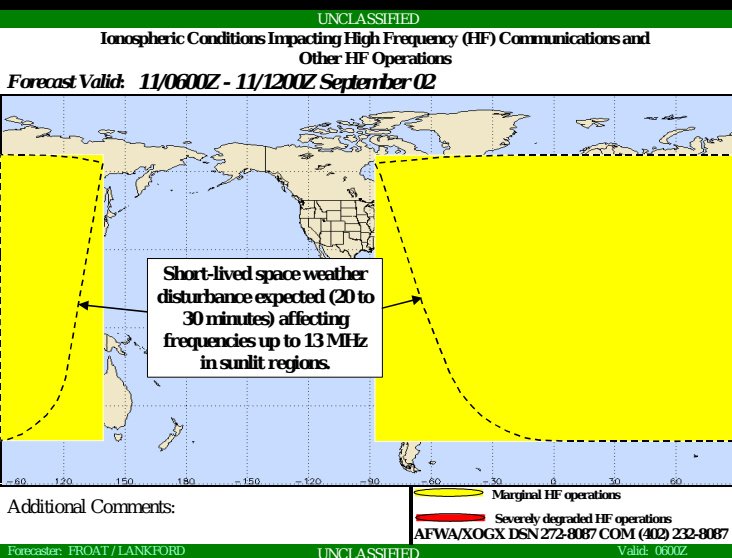


Issued once a day on JAAWIN for selected global locations. Includes a HF Illumination forecast up to 48 hours. Identifies areas where user-defined point location are most likely to have greatest strength, best signal-to-noise ratio, or worst propagation.



# Communication Products

## Short Wave Fade Event Warning



WOXX50 KGWC 190143

SUBJECT: AFWA EVENT WARNING REPORT ISSUED AT 0143Z 05 MAY 2002

PART A. SHORT WAVE FADE EVENT:

A SOLAR X-RAY FLARE OCCURRED AT 0140Z 05 MAR 2002 AND IS CAUSING

DISRUPTIONS IN HF PROPAGATION. ANOTHER MESSAGE WILL BE ISSUED

WITH MORE INFORMATION WHEN X-RAY LEVELS PEAK.

PART B. THIS EVENT WILL AFFECT HIGH FREQUENCY RADIO COMMUNICATIONS

AND INTERCEPT CAPABILITY IN DAYLIT AREAS OF THE GLOBE. SUCH AN

EVENT LASTS UP TO TWO HOURS.

PART C. REMARKS:

ISSUED BY THE AIR FORCE WEATHER AGENCY, OFFUTT AFB, NE.

IF YOU HAVE QUESTIONS OR REQUIRE FURTHER INFORMATION, CALL THE

IDENTIFICATION CANAL AND DSN 272-8087, COM AFCEC, AFCEC 2-78.

INFORMATION CAN ALSO BE OBTAINED AT <https://weather.af.mil> UNDER THE SPACE WEATHER LINK.

Issued via AWN, fax, phone, pager, and e-mail when a space weather disturbance suddenly degrades HF conditions. Identifies HF frequency ranges and locations that are affected by an observed sudden disturbance and then forecasts duration and magnitude of



# Communication Products

## Polar Cap Absorption Event Warning

FOXX50 KGWC 271601

SUBJECT: AFWA EVENT WARNING REPORT ISSUED AT 1601Z 02 MAR 2002

PART A. POLAR CAP ABSORPTION EVENT IN PROGRESS (UPDATE):

THE PCA EVENT THAT BEGAN NEAR 2001Z 02 MAR 2002 IS CONTINUING.

THE PCA IS FORECAST TO LAST UNTIL 1601Z 06 MAR 2002

THE PEAK ABSORPTION OBSERVED ON THE THULE 30 MHZ RIOMETER DURING

THE PAST SIX HOURS WAS 4 DBS. MAXIMUM DAYTIME ABSORPTION IS EXPECTED

TO BE ABOUT 5 DBS, WHILE MAXIMUM NIGHTTIME ABSORPTION WILL BE ABOUT

3 DBS THIS MESSAGE WILL BE UPDATED EVERY 6 HOURS UNTIL THIS EVENT ENDS

PART B.

HF PATHS OPERATING POLEWARD OF ABOUT 55 DEGREES LATITUDE MAY

EXPERIENCE SIGNAL ABSORPTION, WITH GREATEST ABSORPTION OCCURRING

IN THE DAYLIGHT HOURS. LF/VLF SYSTEMS OPERATING IN OR THROUGH

THE POLAR CAP MAY EXPERIENCE PHASE ADVANCES.

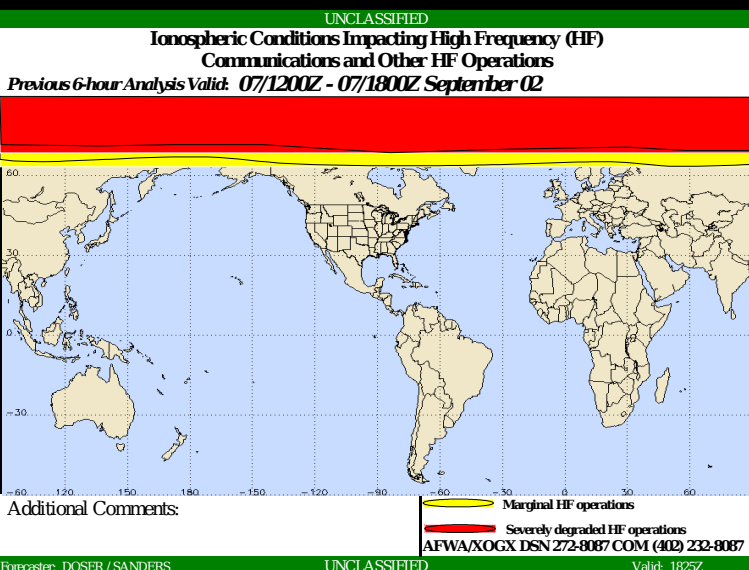
PART C. REMARKS:

ISSUED BY AIR FORCE WEATHER AGENCY, OFFUTT AFB, NE.

IF YOU HAVE QUESTIONS OR REQUIRE FURTHER INFORMATION, CALL THE

DUTY FORECASTER AT DSN 272-8087, COMMERCIAL 402-232-8087.

INFORMATION CAN ALSO BE OBTAINED AT <https://weather.afwa.af.mil>.

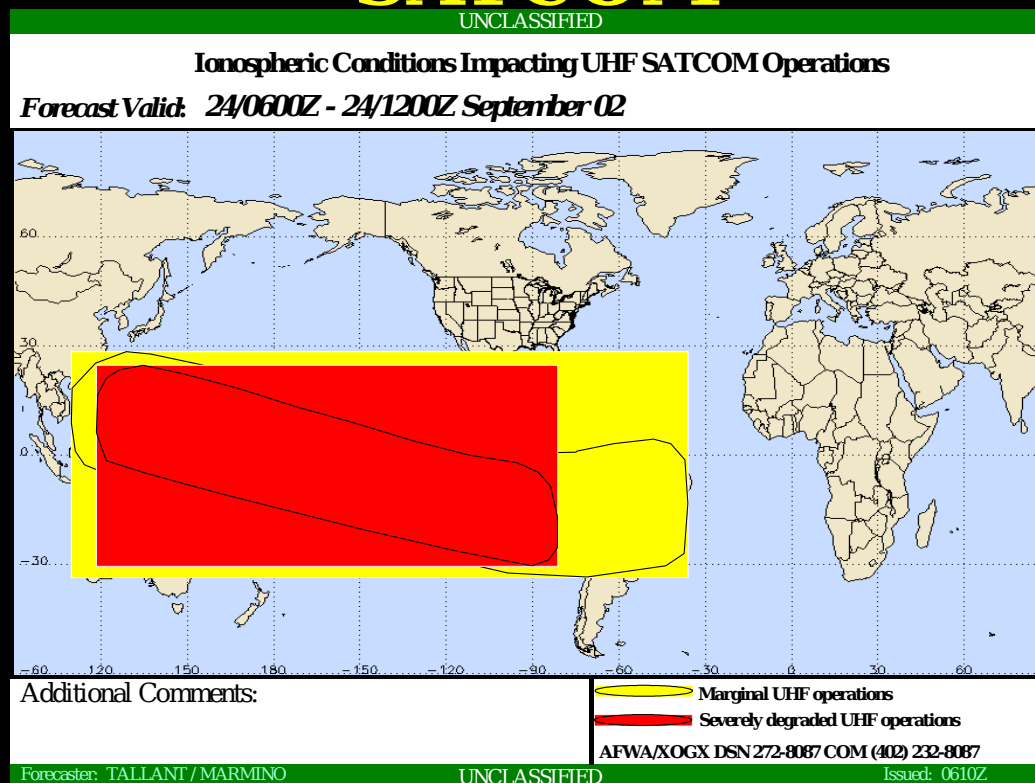


Issued via AWN, fax, phone, pager, and e-mail when HF conditions have been severely degraded primarily at high latitudes due to a space weather disturbance.



# Communication Products

## Global/Regional 6-Hr Forecast of Ionospheric Conditions Impacting UHF SATCOM

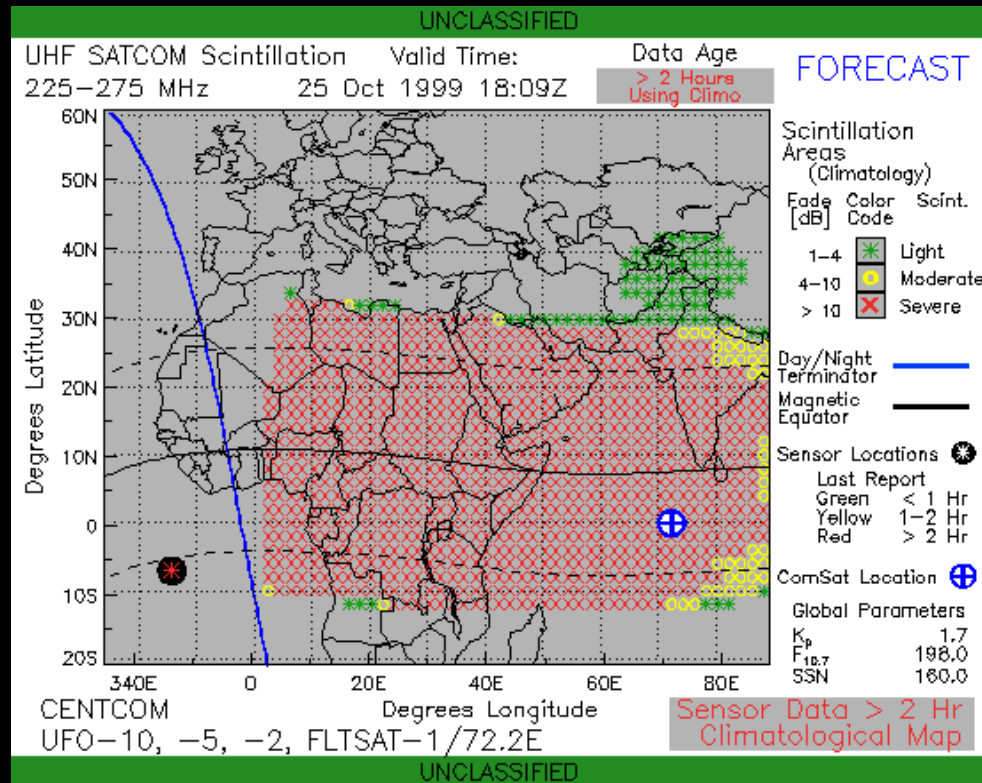


Issued four times daily and available on JAAWIN/JAAWIN-S.  
Identifies locations where space weather conditions are expected to



# Communication Products

## UHF Scintillation Nowcast/Forecast

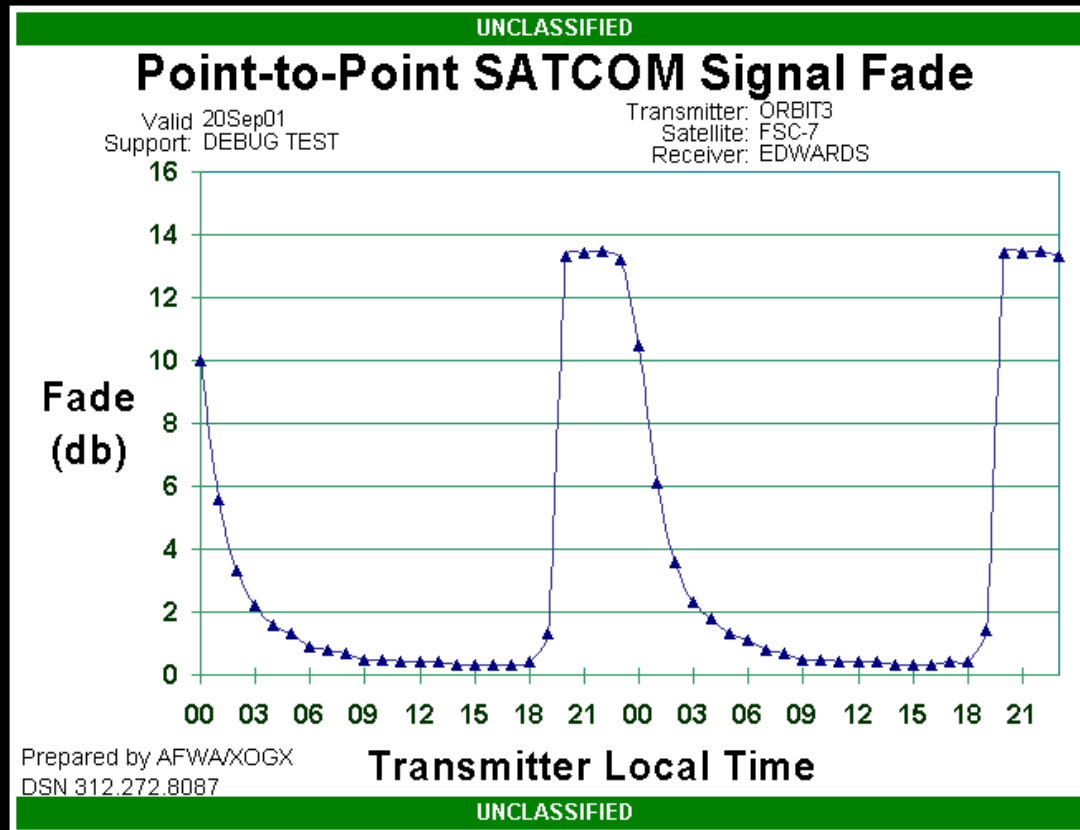


Issued for selected global regions once per day for 72 hours at 2-hr intervals. This version is no longer produced on JAAWIN, only JAAWIN-S. Also available on JAWIIN-S are observed scintillation maps. Identifies locations where space weather conditions are



# Communication Products

## Point-to-Point SATCOM Signal Fade



Issued on JAAWIN/JAAWIN-S upon request of customer/user.  
Identifies UHF SATCOM signal fades.



# ***Radar Interference***

## **Radio Event Warning**

**WOXX52 KGWC 282138**

**SUBJECT: AFWA EVENT WARNING REPORT ISSUED AT 2138Z 30 JAN 2002**

**PART A.**

**THE SOLAR RADIO EVENT WHICH BEGAN AT 2138Z 30 JAN 2002 CAUSED BURSTS OF:**

**FREQUENCY (MHZ):     245         410         4995**

**PEAK FLUX (SFU):     5000         5400         8100**

**TIME OBSERVED:     2138Z     2138Z     2138Z**

**PART B.**

**THIS EVENT COULD HAVE AFFECTED SPACECRAFT COMMAND AND CONTROL,  
CAUSED RADIO FREQUENCY INTERFERENCE, AND/OR INTERCEPT CAPABILITY.**

**PART C. REMARKS:**

**ISSUED BY THE AIR FORCE WEATHER AGENCY, OFFUTT AFB, NE.**

**IF YOU HAVE QUESTIONS OR REQUIRE FURTHER INFORMATION, CALL THE  
DUTY FORECASTER AT DSN 272-8087, COMMERCIAL 402-232-8087.**

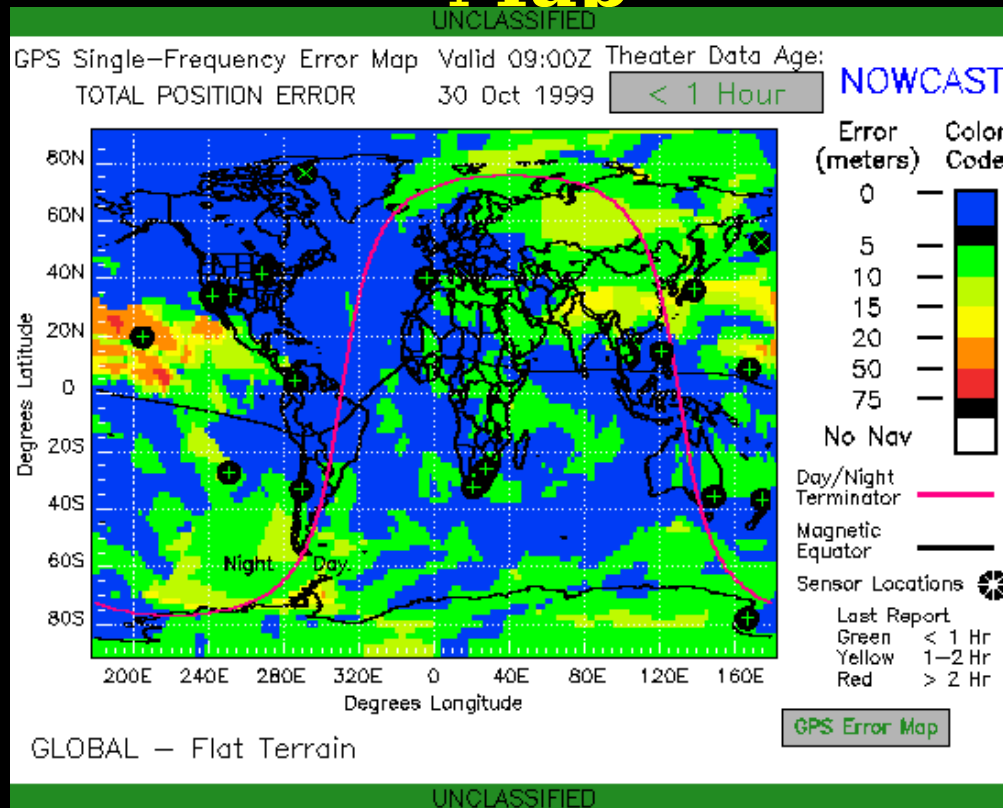
**INFORMATION CAN ALSO BE OBTAINED AT <https://weather.afwa.af.mil>  
UNDER THE SPACE WEATHER LINK.**

**Issued via the AWN, fax, telephone, pager, and e-mail when the Sun emits a severe burst of radio wave energy. Identifies UHF SATCOM and RADAR frequency ranges affected by an observed burst of radio wave energy capable of causing interference; include burst strengths and frequencies.**



# Navigation Products

## Estimated GPS Single-Frequency GPS Error Map



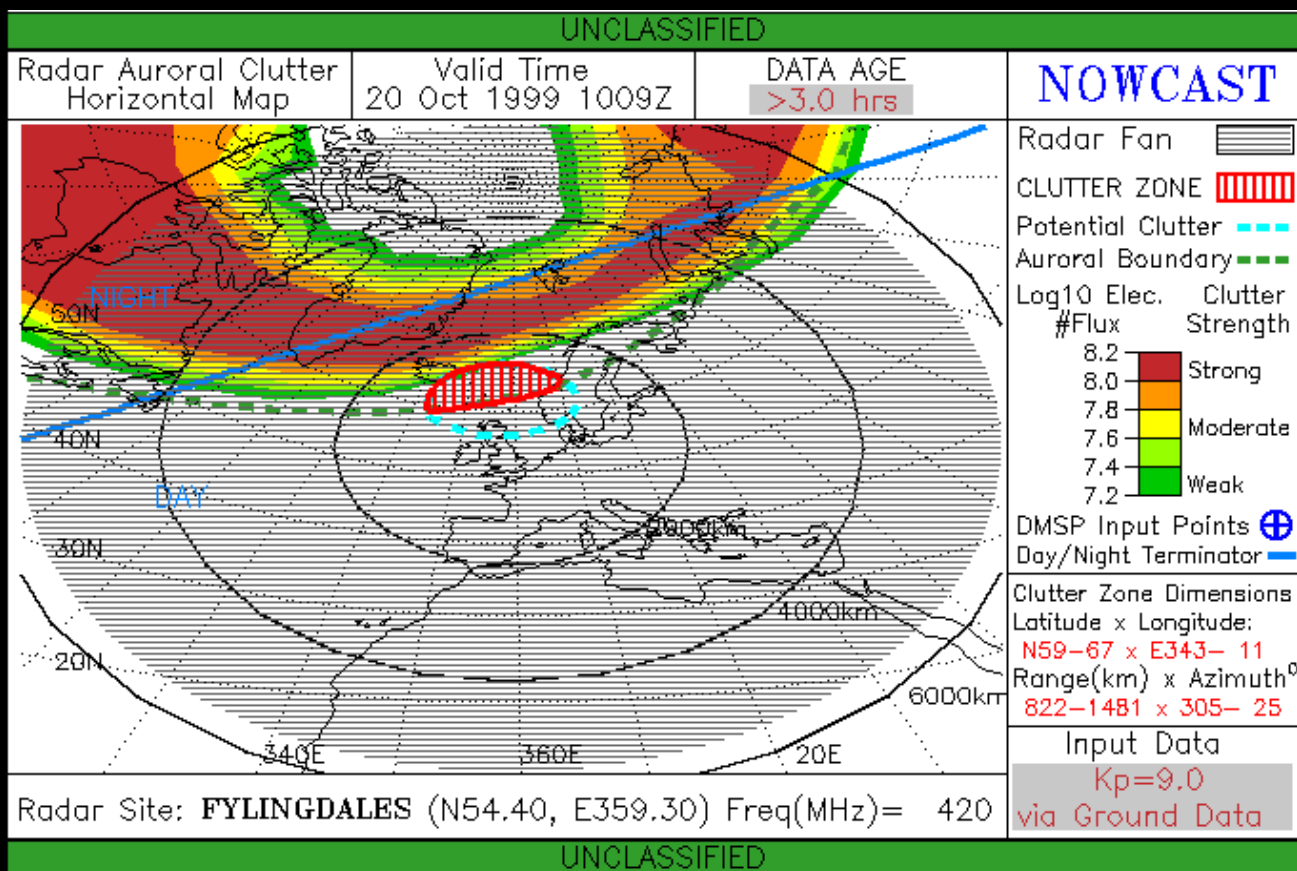
Issued every hour on JAAWIN. Identifies estimates of current single-frequency GPS accuracy based on calculations that take into account ionospheric-induced errors. This product is not valid for Dual Frequency GPS receivers.





# Radar Interference

## Radar Auroral Clutter Nowcast/Forecast



Issued every hour on JAAWIN-S. Identifies radar clutter caused by the aurora.



# ***Radar Interference***

## **Solar Radio Burst Warning**

NWXX50 KGWC 190219

SUBJECT: AFWA ADVISORY REPORT ISSUED AT 0219Z 07 JUL  
2002

PART A. A SIGNIFICANT RADIO BURST IS IN PROGRESS

THE FOLLOWING SITES MAY EXPERIENCE INTERFERENCE:

ALCOR, ALTAIR, ANTIGUA, ASCENSION, BEALE,

BUCKLEY, CAPE COD, CAVALIER, CLEAR, EGLIN,

FYLINGDALE, KAPAUN, MILLSTONE, SHEMA, AND THULE.

PART B. RADAR SYSTEMS MAY EXPERIENCE INCREASED NOISE  
LEVELS AND

FALSE TARGETS. SATELLITE COMMUNICATIONS MAY  
EXPERIENCE

INCREASED NOISE LEVELS OR LOSS OF COMMUNICATIONS  
DUE

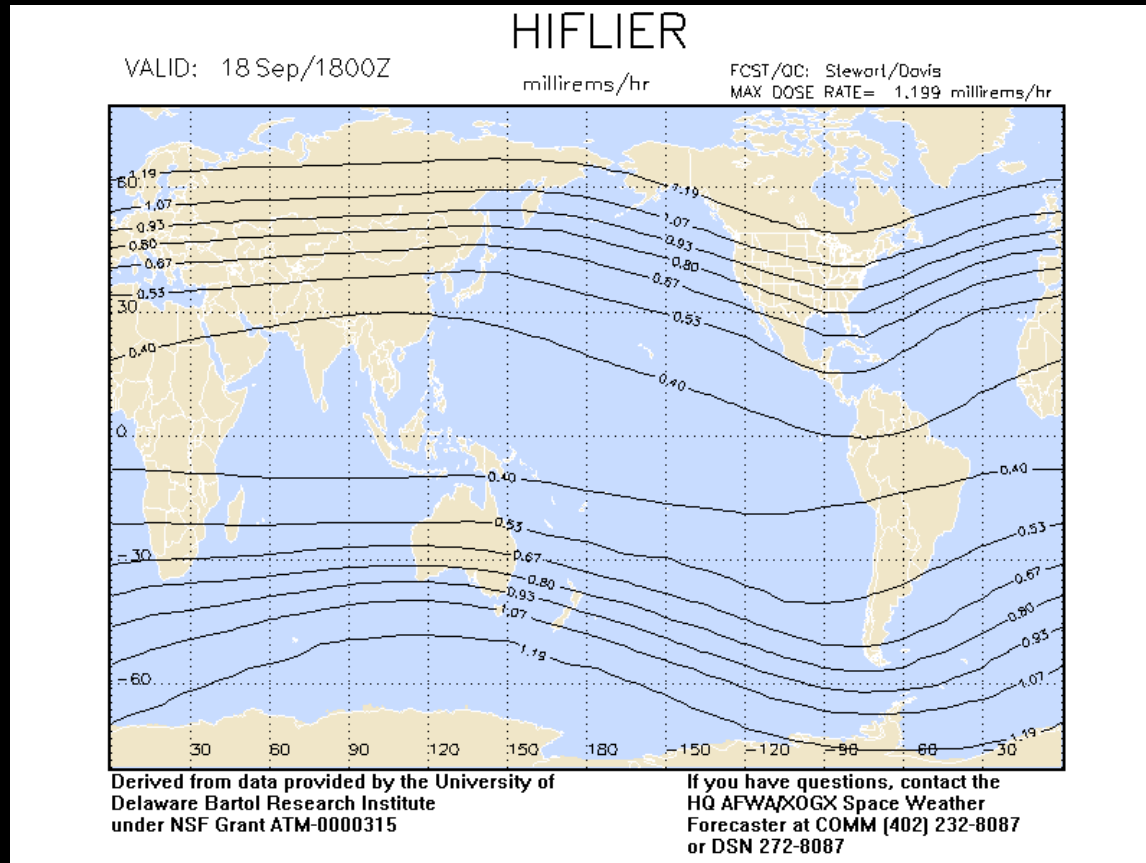
TO INTERFERENCE.

Issued via the AWN, fax, telephone, pager, and e-mail when the Sun emits a severe burst of radio wave energy. Identifies RADAR sites that could potentially get false readings due to an observed burst of radio wave energy.



# High Altitude Flight

## High Altitude Radiation Dosage Charts



Issued four times daily via JAAWIN based on cosmic radiation measurements. Quantifies the global level of radiation dosage at high altitudes based on background cosmic radiation. Followed up by faxed notification during high-energy particle events.



# *Satellite Operations*

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- Event Warnings
  - Geomagnetic activity
  - Deep-dielectric charging
  - Energetic proton events
- Post-event analysis (anomaly assessments)
- Routine parameter specification and forecasting for orbit analysis, sensor calibration, etc.

These products are issued throughout the day or as needed to specific customers.



# *Space Object Tracking*

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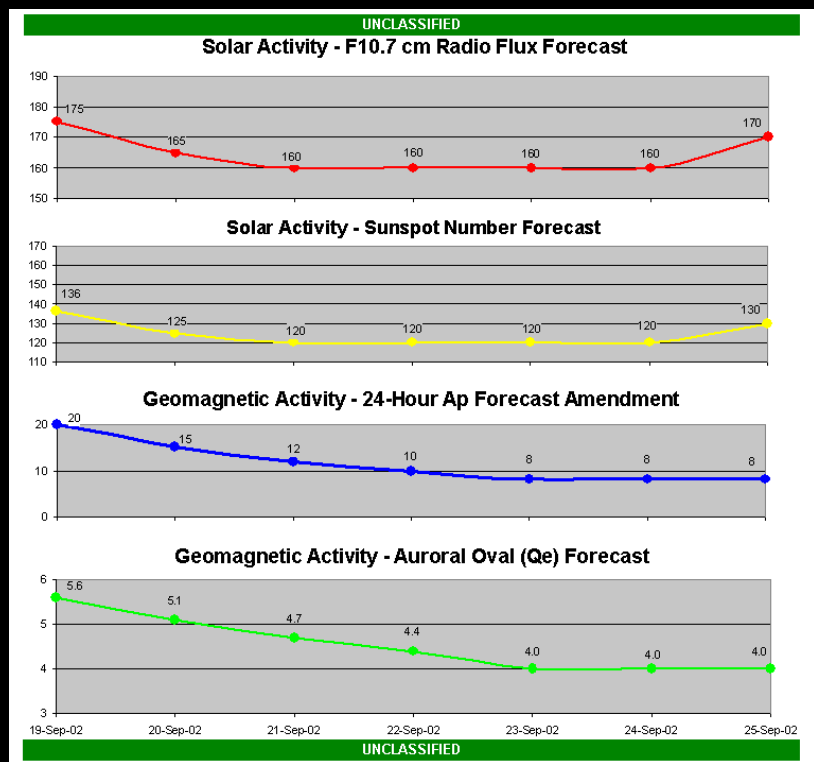
- Specification and forecast of geomagnetic activity
  - 3 hour  $a_p/K_p$  and 24 hour  $A_p/K_p$
- Specification and forecast of solar flux
  - 2800 MHz/F10.7 cm
- Parameters used for drag calculation and forecasting by NORAD

These products are issued throughout the day or as needed to specific customers.



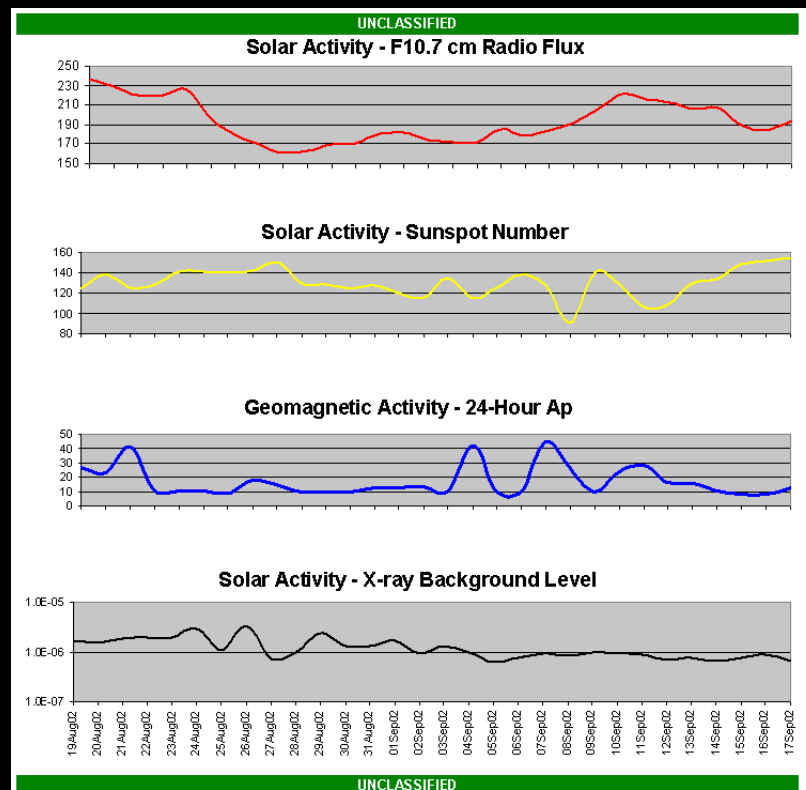
# General Briefing Products

## Space Wx Indices Forecast and Trend



### 7-Day Forecast

### 30-Day Trend

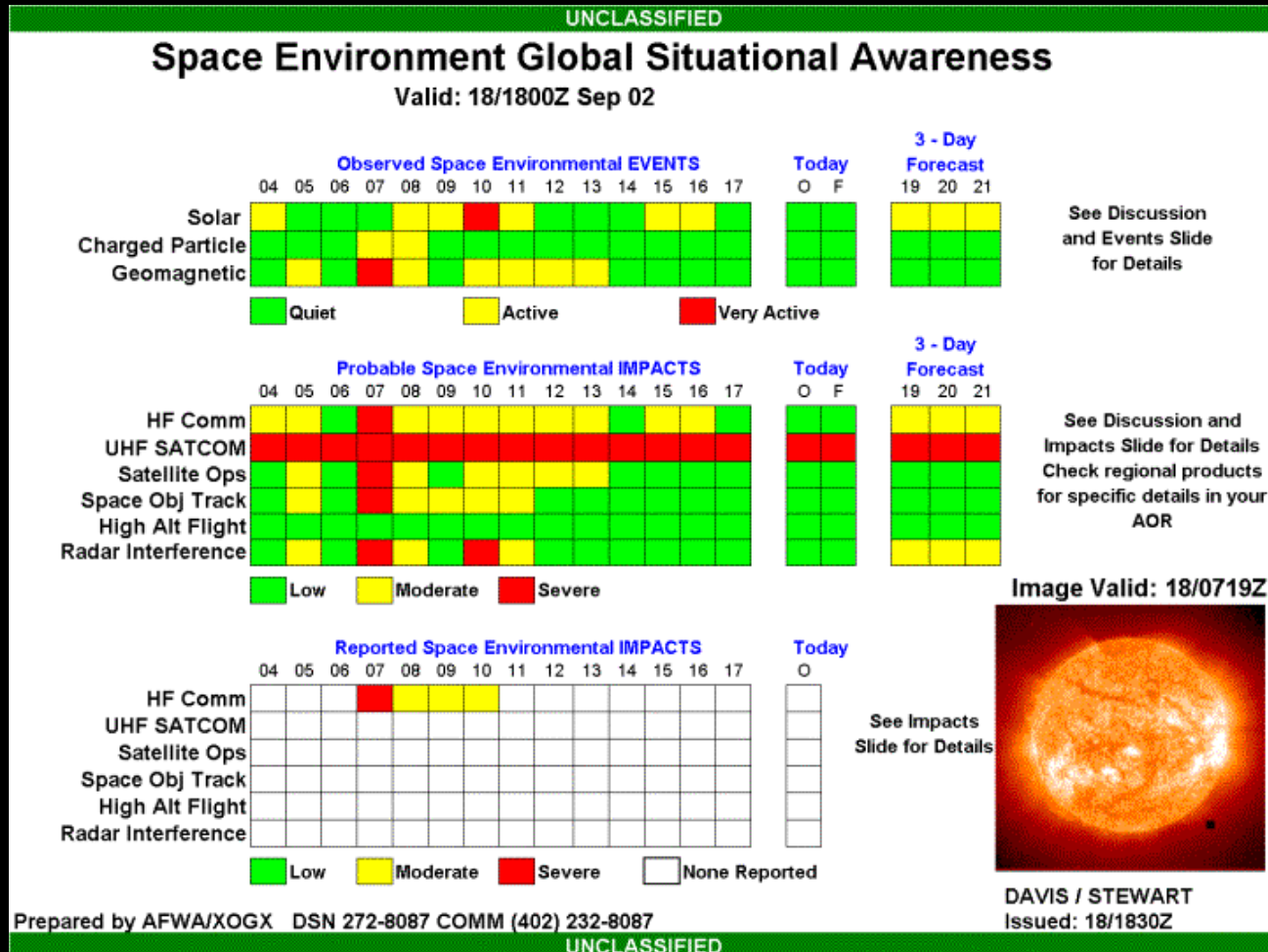


Issued every day on JAAWIN. Identifies forecasted solar activity as well as solar activity trend.



# General Briefing Products

## Events and Impacts Slide



Issued every six hours on JAAWIN. Identifies forecasted solar activity as well as solar activity trends and impacts to military



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# ***Training Information***

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## Keesler Courses

- Space Environment Course (E3OZR15W3A-000)
  - 3 Weeks on Space Weather Basics
- Space Forecasting Course
  - 2 Week



# ***Training Information***

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## **HQ AFWA/DN Web Site**

[https://wwwmil.offutt.af.mil/afwadnt/space\\_weather.htm](https://wwwmil.offutt.af.mil/afwadnt/space_weather.htm)

## **Space Weather Training Guide**

**FYI #37, Space Environment Impacts to DoD Operations**

**AFSPC Pamphlet 15-2, Space Environment Impacts on DoD Operations**

**DRAFT AF Catalog 15-152 Volume 5, Space Environment Products**

## **From AFCCC**

**Space Weather Training and Requirements CD**



# ***Training Information***

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If you have a question on any one of them, please give us a call.

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**DSN 272-8087**

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**Commercial (402) 232-8087**  
**6557**

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